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Renewable Energy Transmission Initiative
Phase 1A Work Group Meeting 4

Black & Veatch

Phase 1A Work Group

February 21, 2008

Agenda

- Actions Taken Last Meeting
- Carry-over items from 2/14/08 meeting
  - Resources included in base case
- Economic assumptions to support resource valuation
- Resource valuation methodology

Actions Taken Last Meeting

- Tax Incentives:
  - Base Case: Existing tax credits will exist through 2020
  - Model will have ability to toggle tax incentives in each year
- CA Demand and RPS Requirements
  - Demand: CEC IEPR forecast for state loads
  - RPS Requirement: 20% by 2013, 33% by 2020 for all entities
  - CSI Assumptions
    - 3000 MW installed
    - ½ of installed CSI capacity will be available to utilities for RPS compliance (approx. 0.7% of CA demand)

Assumptions

- Financial assumptions for use in modeling 
- Renewable energy incentives 
- Renewable energy demand 
- Transmission **1 week**
- Economic assumptions to support resource valuation **Today**
- Renewable technology-specific assumptions **1 week**

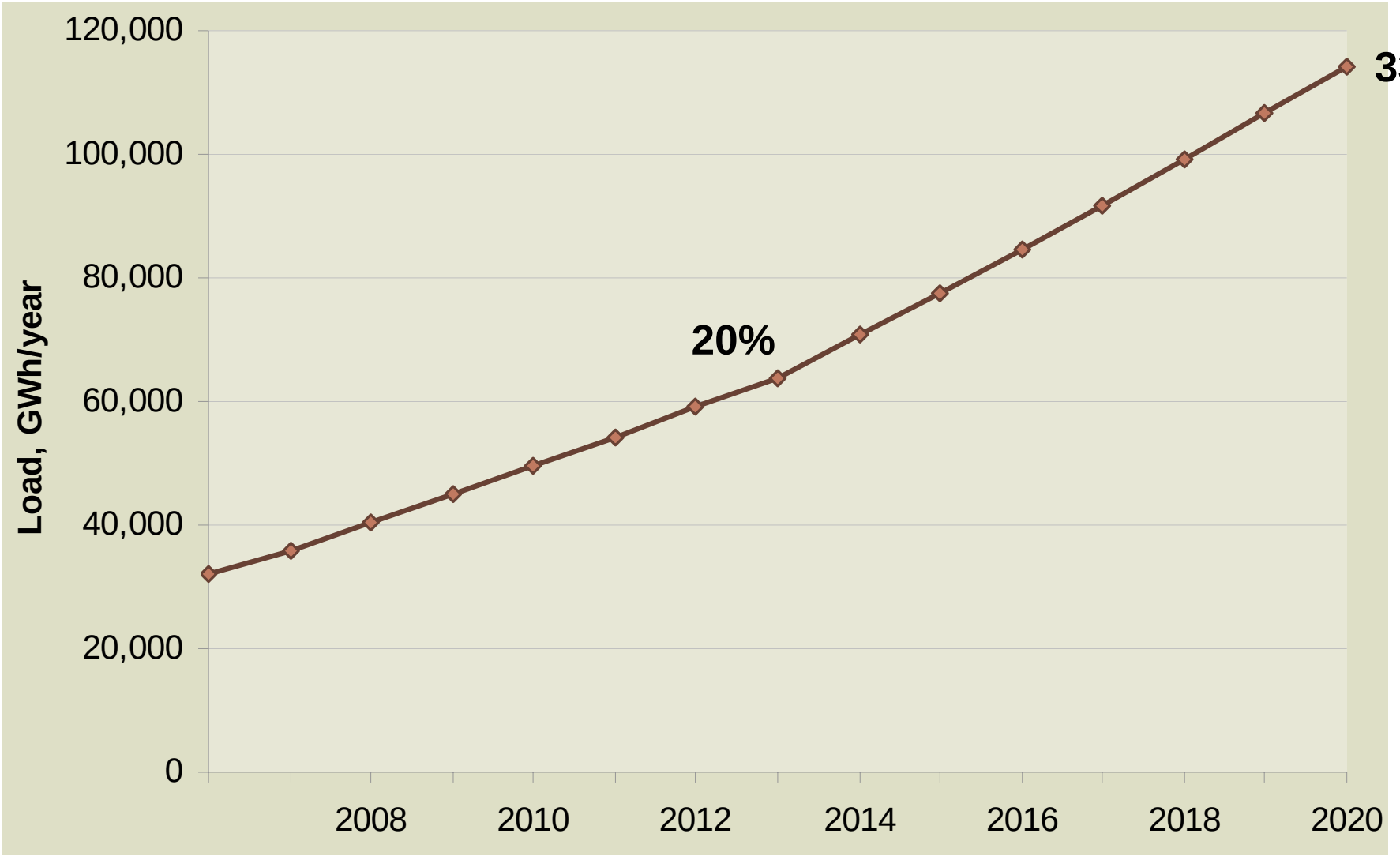
Methodological Issues

- Resource assessment — **1 weeks**
- Project identification, characterization and screening — **2 weeks**
- CREZ identification, characterization and economic ranking — **2 weeks**
- Treatment of existing and short-listed contracts and transmission queue — **Today**
- Technology development — **1 week**
- Resource valuation — **Today**
- Supply curve creation

Treatment of existing contracts, short-listed contracts and transmission queue

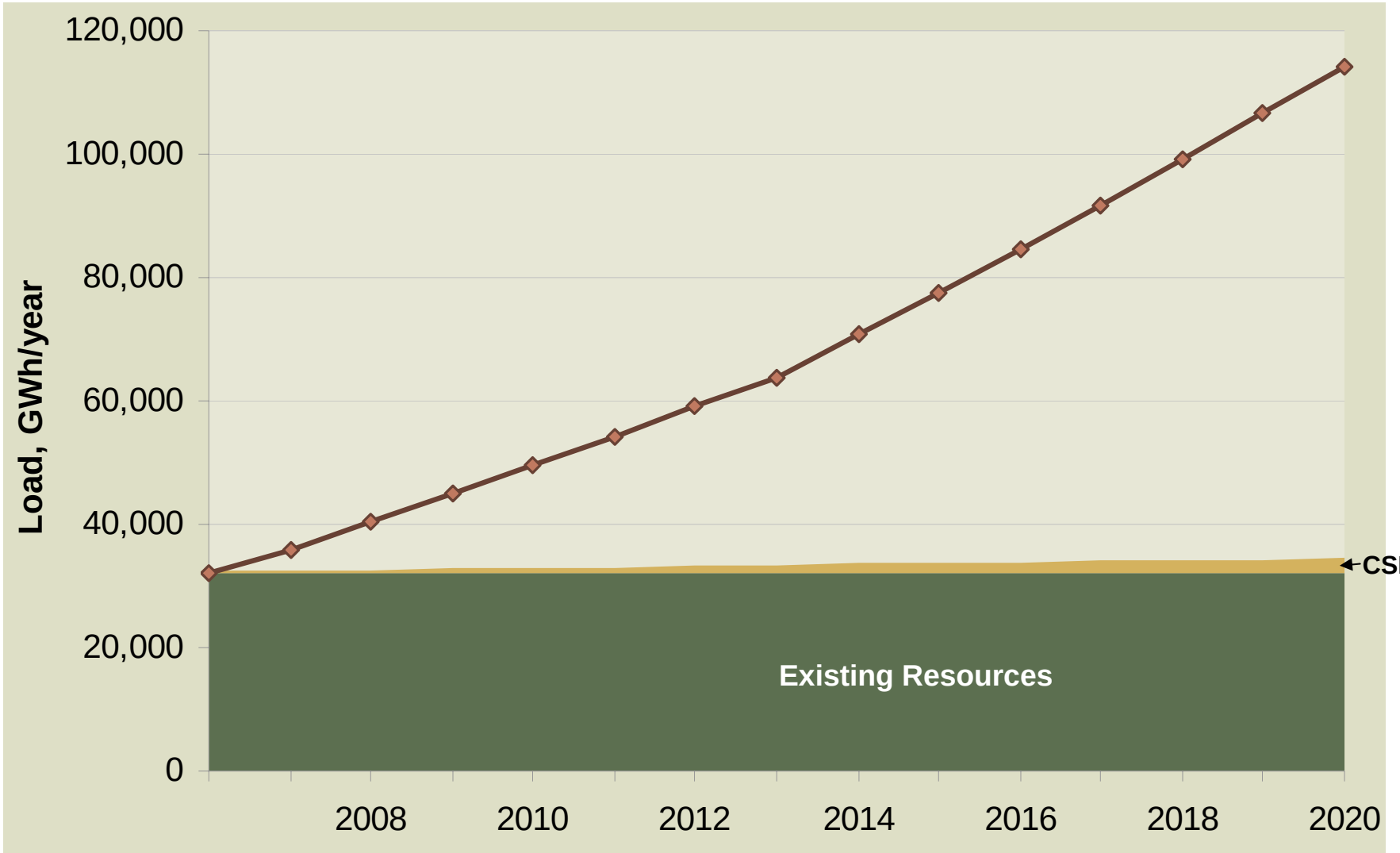
- We need to establish a **RETI Base Case** – generation projects assumed to be “built”
  - Impacts RPS demand forecast (RETI “net short”)
  - Impacts Project Identification
  - Impacts Transmission Availability

California RPS Target



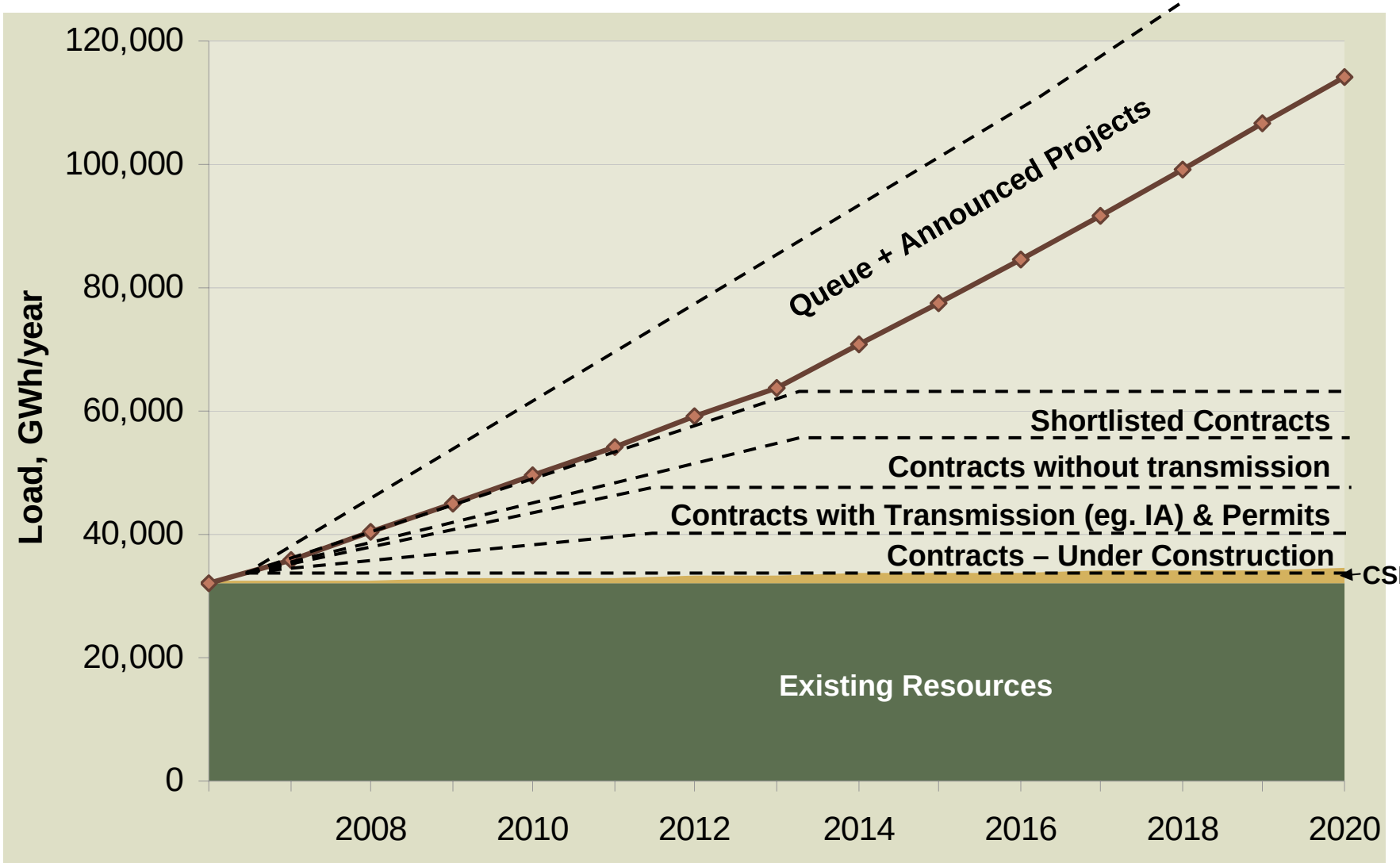
CONCEPTUAL – FOR EXAMPLE ONLY

Existing Resources + CSI



CONCEPTUAL – FOR EXAMPLE ONLY

What other Resources to Assume are "Existing"?



CONCEPTUAL – FOR EXAMPLE ONLY

Renewable Generation Included in RETI

- **"Existing" Resources** in the Base Case
  - Existing projects
  - Under-construction projects
  - Projects with all three of: PPA, siting approval, Interconnection Agreement
- **Potential Resources** with near-term Commercial Interest (an *expected* on-line date has been identified, 03/08)
  - PPA (approved, pending)
  - Short-listed projects
- Additional **Potential Resources**, but no pre-defined on-line date
  - Proposed projects with no PPA
  - ISO queue projects
  - All other resources

Same criteria used for California and non-California resources

Transmission Included in the Base Case

- Existing transmission
- Transmission projects under construction
- Transmission projects approved by all necessary regulatory agencies (FERC, CEC, CPUC, CAISO, etc.)

Same criteria used for California and non-California transmission projects

Resource Valuation Methodology - Economic assumptions to support resource valuation

- Valuation is a way to measure disparate resources consistently. Valuation is designed to identify:
  - Lowest cost renewable resources

    and

  - Highest value renewable resources
- Values will be used to:
  - Develop resource supply curves
  - One of criteria used to develop and rank CREZ's

The proposed RETI valuation methodology is generally consistent with the process utilities use to procure renewable resources

Resource Valuation Methodology

Ranking Cost = Costs - Value

Costs	Value
Generation Cost + Transmission Cost + Integration Cost	Energy Value + Capacity Value

Generation Cost

- Levelized Cost of Energy (LCOE) - $/MWh
  - Calculated using a pro forma cash flow model for each project
  - Model is consistent with that used by the CPUC for MPR calculation

Technology – Specific Assumptions	
Capital Cost	**Incentives**
Fixed O&M	**Net Plant Output**
Variable O&M	**Capacity Factor**
Fuel Costs	**Economic Life**
Heat Rate	

General	
	Discount Rate
	Inflation

Transmission Cost

- Levelized Cost of Transmission (LCOT) - $/MWh
  - Calculated with economic model consistent with that used by California IOUs

Fixed Costs

- **Resource interconnection costs**
- **Network upgrade costs**
- **Trunk line costs**

Variable Costs

- **Transmission access / wheeling charges**
  - **Assume CAISO charges for all projects**
  - **Pancake wheeling rates for out-of-state resources**
- **FTR/CRRs – no cost / value assumption**

Integration Cost

- Integration cost will be neglected for Phase 1A
  - CEC has not adopted integration values
  - CAISO identifies integration requirements but not cost

May be revisited in RETI Phase 2

Energy Value

Energy value = **(resource generation x zonal, T.O.D. market price),** where:

- Market Price – hourly forecast (2008-2020) using commercially available production cost model
- Zonal prices – energy priced in zone where resource is located (15 zones):
  - 8 in California, 7outside California
- TOD factors – based on WECC trade periods
  - Super-peak
  - On-peak
  - Off-peak

Price Zones

N. California (NP15)	Imperial I.D.	N. Nevada
C. California (ZP26)	Imperial V. - NG	S.Nevada
SCE	CA/OR Border (COB)	Palo Verde
LADWP	Pacific Northwest	Arizona
SDG&E	British Columbia	N. Baha (Mex.)

Capacity Value

Capacity value =**(Resource availability * Annual value of capacity),**

where:

- Resource Availability - projected average resource generation during 12:00 - 6:00 p.m. period (all months)
  - Consistent with current Resource Adequacy practice
- Annual value of capacity – fixed carrying costs of the gas turbine

  (Capital Costs, Fixed O&M, fixed charges)

Example:

If the fixed costs of a GT = $128/kW-year, the value of different renewable resources would be…

Resource	12:00-6:00 CF (%)	Cap. value ($/kW-year)
Solar (1)	41	52.48
Solar (2)	33	42.24
Wind (1)	38	48.64
Wind (2)	24	30.72
Bio	87	111.36
Geo	93	119.04

Resource Value Example- Energy and Capacity

Conceptual - For Example Only!

	Wind	Solar	Biomass
Energy Component			
Marginal Energy Value Forecast ($/MWh)			
Day	$85	$85	$85
Night	$50	$50	$50
Average Production per Period (MWh/yr)			
Day	1,000	3,000	1,500
Night	2,000	-	1,500
Total	3,000	3,000	3,000
Annual Value of Energy ($/yr)			
Day	$ 85,000	$ 255,000	$ 127,500
Night	$ 100,000	$ -	$ 75,000
Total	$ 185,000	$ 255,000	$ 202,500
Average Energy Value ($/MWh)	**$ 61.67**	**$ 85.00**	**$ 67.50**
Capacity Component			
Annual Capacity Factor	35%	35%	90%
Capacity Credit	25%	90%	100%
Simple Cycle NG Capacity value, $/kW-yr	$100	$100	$100
Capacity Value, $/kW-yr	$25	$90	$100
Capacity value, $/MWh	**$ 8.15**	**$ 29.35**	**$ 12.68**
Total Value ($/MWh)	**$ 69.82**	**$ 114.35**	**$ 80.18**





Thank You!

Ryan Pletka
pletkarj@bv.com
Tel: 925-949-5929

Ric O'Connell
oconnellrm@bv.com
Tel: 925-949-5914

Tim Mason
masont@bv.com
Tel: 925-949-5943